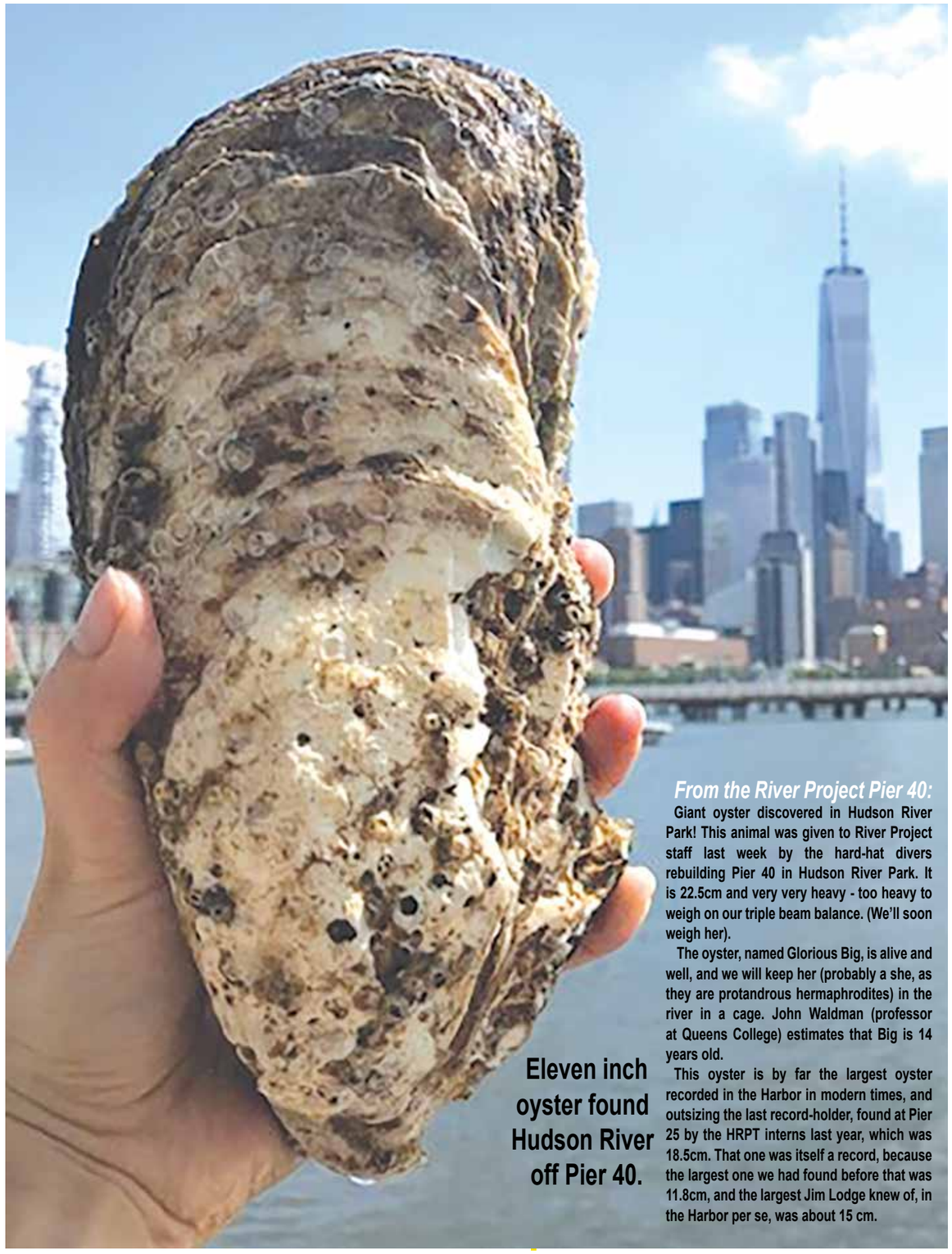


Eleven inch oyster found Hudson River off Pier 40.

From the River Project Pier 40:

Giant oyster discovered in Hudson River Park! This animal was given to River Project staff last week by the hard-hat divers rebuilding Pier 40 in Hudson River Park. It is 22.5cm and very very heavy - too heavy to weigh on our triple beam balance. (We'll soon weigh her).

The oyster, named Glorious Big, is alive and well, and we will keep her (probably a she, as they are protandrous hermaphrodites) in the river in a cage. John Waldman (professor at Queens College) estimates that Big is 14 years old.

This oyster is by far the largest oyster recorded in the Harbor in modern times, and outsizing the last record-holder, found at Pier 25 by the HRPT interns last year, which was 18.5cm. That one was itself a record, because the largest one we had found before that was 11.8cm, and the largest Jim Lodge knew of, in the Harbor per se, was about 15 cm.

Disponible en línea en español.

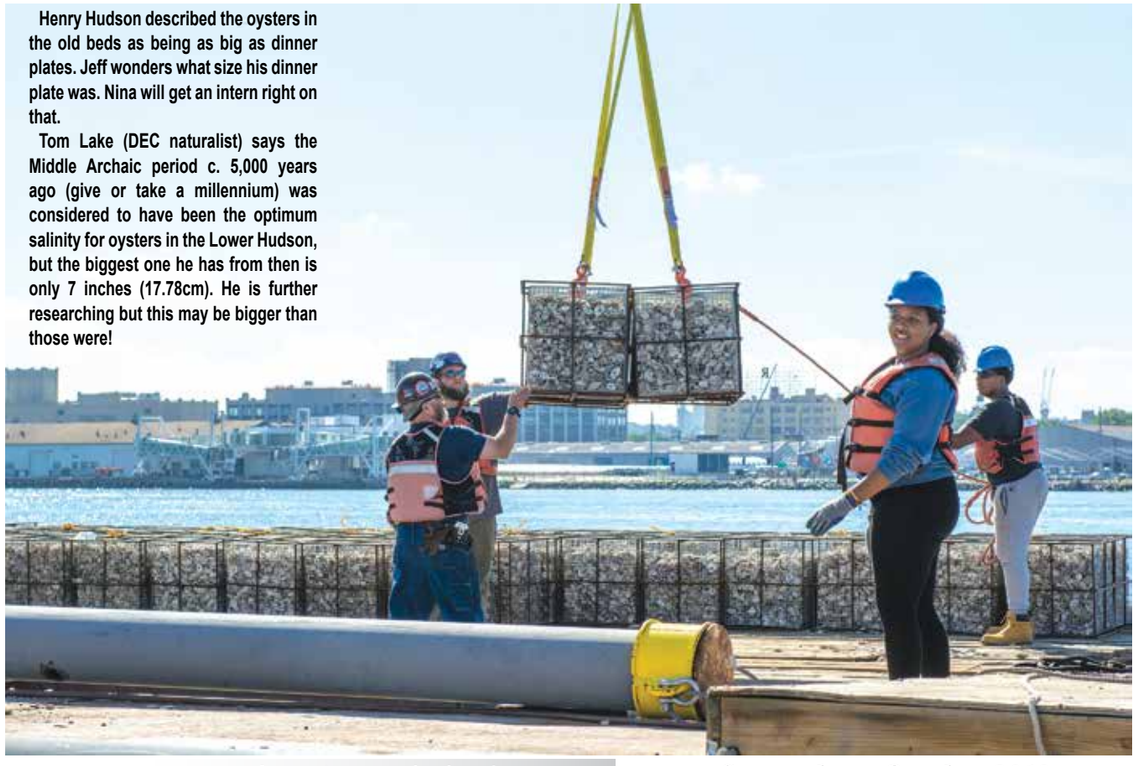
The Wonderful Oyster Is Coming Back Strong

by John H. Vargo, Publisher

Imagine what the mouth of the Hudson River looked like with oyster reefs covered with these huge oysters everywhere!

Henry Hudson described the oysters in the old beds as being as big as dinner plates. Jeff wonders what size his dinner plate was. Nina will get an intern right on that.

Tom Lake (DEC naturalist) says the Middle Archaic period c. 5,000 years ago (give or take a millennium) was considered to have been the optimum salinity for oysters in the Lower Hudson, but the biggest one he has from then is only 7 inches (17.78cm). He is further researching but this may be bigger than those were!



There is no better sign of the tremendous improvement in the quality of the Hudson River than the dramatic return of Oysters!

The Hudson River has reached a point of cleanliness that oysters, once in the river by the millions, are being brought back in a big way.

I have lived in, on and around the Hudson River all my live. One of the first things you recognize while fishing in Haverstraw Bay is the remarkable amount of ancient oyster shells that still exsist on the bottom.

No matter where you anchor from Stony Point to the north and Croton Point five miles away to the south, you will pick up an oyster shell on your anchor or hook. At Croton Poiint Park there is an Oyster "dig" that has found 4000 year old oysters.

Oysters, once established, can, and will filter enormous amounts of water that will help clean the Hudson River even further. (Actually the oyster projects described here are designed to do exactly that, Oyster Reefs create a huge biodivesity of marine life that ehances all Hudson River eco systems!)

Sadly there is a serious threat to the oysters as well as to the economic vitliity of the Hudson River Silt washed into the Hudson River through its main arterial rivers such as the Roundout in Kingston, the Espous in Saughteries and other rivers. This was dramaticly emphasized when Hurricane Sandy and Irene dumped so much water on the Catskill Mountains it washed fields of pumpkins, watermelons, corn and other rich farmlands into the Hudson River. The River did not settle down for at least 6 months. That is probalby the most serious threat that an oyster reef system of more than 5 acres will have in the Tappan Zee Bridge area where the latest Oyster Reefs are being installed.

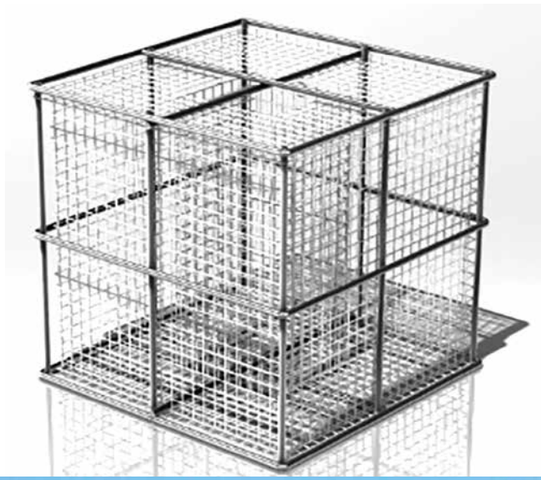
Be that as it may the Harbor School on Governors Island has started and is maintaining a very dynamic Billion Oyster Project that has so many benefits to it that it is hard to see how it can fail, especially in New York Harbor.

The quotes below are from Dr. Hare of the Department of Natural Resources at Cornell University -

"If this native oyster population increases to the size of an ecologically meaningful population, it will filter and clarify lots of river water, help cycle nutrients, and provide habitat for hundreds of species (including juveniles of some commercially fished species). Restoration in the Hudson/Raritan Estuary is not about making tasty oysters grow closer at hand - they will never be for consumption near the harbort - it is about having this biological filter synergize with the slow improvements in water quality generated by the federal Clean Water Act so that all life in the river can proliferate and be more resilient."

Dr Hare went on to say: "Finally, with respect to the Tappan Zee oyster population. Nobody knew the extent of this population before the Thruway authority (AKRF) did their surveys. Most estuaries (like the Chesapeake) have their highest oyster abundance in the middle reaches of the estuary where oceanic salinity has been moderated and oysters can more easily escape the pathogens and predators that live closer to the ocean.

The middle part of the Hudson/Raritan Estuary, in terms of salinity, is at the NYC harbor. In the



Gabion reef structure, (Note these structures are purposely built of uncoated steel so they will rust out, leaving the oyster to grow on their own clinging to the empty oyster shells placed with them.)

One of the Billion Oyster groups in New York Harbor working on this amazing project.

Hudson/Raritan Estuary there are no known oyster populations that are reproductively self supporting except what has been discovered near the Tappan Zee Bridge. This is based on my data on the annual production of oyster babies (larvae that settle on hard shoreline substrate) showing that the Tappan Zee population regularly reproduces to fill the upper river with oyster larvae, but no other region of the estuary benefits from this annual procreation. Tappan Zee oysters are the remnant population that we need to expand if we want to return biodiversity to the lower estuary. The Thruway Authority effort is focused on making the Tappan Zee population stronger and larger, by adding habitat for oyster babies (larvae) to settle on. It was my genomic data, produced here at Cornell by contract for AKRF, that provided a comparison of Tappan Zee oysters with other populations and helped convince the Oyster Working Group that Tappan Zee restoration should focus on adding habitat, NOT planting hatchery-produced oysters (because there is an existing population with plenty of reproduction). Much still needs to be done to understand why larvae from Tappan Zee oysters don't naturally move down river with the Hudson current and repopulate the lower estuary. That has been the focus of my research, studying oyster growth, survivorship and reproduction in habitats throughout the estuary (by outplanting and studying experimental oysters at multiple sites to understand where oysters can thrive, where they can't, and why)."

There is another group, the River Project, located on Pier Forty that has been studying the procreation of oysters in New York Harbor as well. Led by Kathy Drew they to have the same objectives as the others.

Actually it was one of their divers that discovered the 11 inch oyster shown in the photo on the first page.

Designing Reef Structures for the Hudson River

Reprinted from the Billion Oyster blog

As we work toward our goal of restoring 1 billion oysters to NY Harbor, designing and redesigning the underwater structures that encourage oyster reef habitat is integral. Billion Oyster Project sent 422 oyster reef structures from our headquarters on Governors Island, where they were designed, welded, and assembled, to a staging area where they await installation into the Hudson River. Once in the Hudson, these oyster reef structures will combine to create the largest reef system in Billion Oyster Project history—covering more than 5 acres of the river. Let's take a closer look at the gabion reef structures deployed in the project and how they've evolved from conception to today.

The Hudson reefs are part of a joint project managed by the NYS Thruway Authority, to restore wild oyster habitat accidentally displaced in construction of the Governor Mario M. Cuomo (formerly Tappan Zee) Bridge. The reef is also expected to create healthy marine habitat for years to come. Billion Oyster Project was selected by the NYS Thruway Authority to construct the gabions. AKRF, Inc., is project and engineering lead, and the Hudson River Foundation and the University of New Hampshire are research partners.

DESIGNING FOR DEEP WATERS

Different reef projects require different materials. For the Hudson reefs system, it was important to consider the fact that these waters are deep and fast moving. Pictured below, the steel gabion structures provide a strong, current-resistant 3D environment that facilities reefing. Since this project is geared toward wild oysters already in the water, note that shells are empty and will provide homes for wild oyster babies (larvae).

PHASE 1

The original gabion deployed in 2015 was designed by Pete Malinowski, New York Harbor School Ocean Engineering instructor Rick Lee, and Harbor School student Marisol, and constructed by Harbor School Marine Systems Technology instructor Clarke Dennis. While the structure effectively prevented oysters from sinking into the mud (a common cause of mortality in murky waters), we found that it could be improved to serve more oysters per foot.

PHASE 2

During the summer of 2017, the Billion Oyster Project initiated a re-design of the reef gabions, with the goal of providing more space on the structure where larvae could set and grow. Ocean Engineering and Marine Systems Technology students from New York Harbor School collaborated with Billion Oyster Project to consider various configurations of materials and submit a proposal to the Thruway Authority.

The main modifications were:

• A hollow column was added to the middle of the structure, maximizing surface area available to oysters and other animals. This is important for three reasons: (1) Oysters will grow on all available outer surfaces (2) We have seen that baby oysters (larvae) swim only 4–5 inches into shells as they're seeking a shell to attach to (3) One of the profound benefits of reefs is the 3D habitat that they create. More surface area means more habitats for oysters and for other marine species.

• A full-unit steel mesh enclosure replaces eight inner cubes, which were held in place with zip ties that sometimes came loose and shifted. Note that the mesh (galvanized steel) holds the shells in, and outer (raw) steel is for stability and ease of lifting and moving the structures.

• The original design used a PVC-coated wire mesh insert. Within three years time, the oysters had reefed up around this material, growing right through the 1" x 1" openings. In an attempt to reduce the amount of unnatural materials added to NY Harbor, we proposed a switch to uncoated steel mesh, which over several years will break down without adding pollutants to the water. (And in the long run, the oysters will cement together and the mesh will no longer be needed to maintain the structure of the reef.)

Report of Nature Conservancy Billion Oyster Project, (For those folks really wanting to study Billion Oyster Project here is a perfect place to start!)

Wow! - there's a lot of good eating in this guy! River project photo.

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